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ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R13-3111
Plant ID No.:	039-00007
Applicant:	Bayer CropScience
Facility Name:	Institute Site
Location:	Institute
NAICS Code:	325320
Application Type:	Modification
Received Date:	August 12, 2013
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$4500.00
Date Received:	August 15, 2014
Complete Date:	October 30, 2013
Due Date:	January 28, 2013
Applicant Ad Date:	October 1, 2013
Newspaper:	*The Charleston Gazette*
UTM's:	Easting: 432.0 km Northing: 4,248.3 km Zone: 17
Description:	The application is for the installation of two 80 MM Btu/hr boilers to replace the 3 existing ones located in Power House #1.

DESCRIPTION OF PROCESS

Bayer CropScience LP (Bayer) owns and operates the Bayer CropScience Institute Site in Institute, West Virginia, which is a chemical manufacturing complex. The site currently configured with one main steam plant (Power House #2). Power House #2 has three 360 MMBtu/hr boiler with a steam output of about 225,000 pounds of steam per hour from each unit (Boilers 10, 11, and 12). This steam is needed to support the chemical manufacturing operation at the site. Due to downturns in the chemical manufacturing operation at the site, the demand for steam has seen a significant decrease over the past couple of years. In 2012, Bayer elected to permanently shut down Power House #1, which was configured with three 180 MMBtu/hr gas-fired boilers. Once Power House #1 was shutdown, the site lost its flexibility to adjust steam output on short notice based on demand.

Thus, Bayer elected to install two package units (Boilers 13 and 14) in January 2013. These units are needed to provide supplement steam on an as needed basis and to alleviate reliability concerns of the steam output from Power House No. 2.

SITE INSPECTION

On October 9, 2013, the writer conducted an announced site visit of the Institute Site. The Bayer representatives were Ms. Connie Stewart, Ms. Linda Tennant, and Mr. Walter Martin. During this visit, the writer was briefed on the steam capacity and demand at the facility.

The visit focuses on the two package units, Power House #2 and Power House #1. The visit of Power House #1was limited to the outside perimeter of the structure. Bayer is in the process of dismantling the entire power house to include the actual structure. At the time of the visit, the contractor was at the stage of assembling the containment barrier as part of the asbestos abatement process.

Currently, Bayer operates the two package units in a hot idle state to ensure the site tenants reliable steam flow at all times. These units are two 80 MMBtu/hr "O" style boilers that were manufactured in 1979 by Zurn. According to the records onsite, these units are configured with a maximum 15% flue gas recirculation system coupled with low-NO_x burners on May 21, 2010. Bayer had already installed Boilers 13 and 14 near a main steam supply header just north of Power House #1. This installation was allowed without first obtaining a permit under Consent Order CO-R13-E-2013-11.

Power House #2 consists of three 360 MMBtu/hr boilers that are located at the west end of the site. Typical steam demand at the site only calls for one of these units to be operated. In 2012, the Power House #2 experienced several equipment failures that reduces steam generating capacity to the point that management elected to install Boilers 13 and 14 on short notice.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant used pollutant specific emissions factors from Chapter 1.4 of AP-42 and manufacturer's data to estimate emissions from the replacement boilers. The writer reproduced the estimated emissions from one replacement boiler, which are presented in the following table:

Table #1 – Emissions from One Replacement Boiler				
Pollutant	**Emission Factor**	**Hourly Rate (lb/hr)**	**Annual Rate (TPY)**	**Annual Rate w/2 units (TPY)**
$PM/PM_{10}/PM_{2.5}$ Filterable	1.9 lb/MMcf	0.15	0.66	1.32
PM Condensable Fraction	5.7 lb/MMcf	0.45	1.97	3.94
Total PM	7.6 lb/MMcf	0.60	2.63	6.48
Sulfur Dioxide (SO_2)	0.6 lb/MMcf	0.05	0.22	0.44
Oxides of Nitrogen (NO_x)	50 lb/MMcf	3.92	17.17	34.34
Carbon Monoxide (CO)	84 lb/MMcf	6.59	28.86	57.72
Volatile Organic Compounds (VOCs)	5.5 lb/MMcf	0.43	1.88	3.76
Total Hazardous Air Pollutants (HAPs)	--	0.15	0.64	1.28
Carbon Dioxide (CO_2)	120,000 lb/MMcf	9,411.76	41,223.51	82,447.02

Based on the information published from the low-NO_x burner manufacturer, the writer estimated the NO_x rate from each unit to be less than 2 pounds per hour. Once the Boiler MACT tune-up requirements become effective in 2016, the writer believes that the CO emission rate from each unit would be less than 6 pounds per hour based on optimizing combustion. Overall the application estimated emissions from the proposed units using acceptable estimation practices.

REGULATORY APPLICABLILITY

The Institute Site is a major source under Title V (45CSR30) and currently possesses a valid Title V Operating Permit. Under this program, new emission units have 12 months upon start-up to be incorporated in the facility's operating permit. The facility is currently classified as a major source for $PM/PM_{10}/PM_{2.5,}$ NO_x, SO_2, CO, VOC, and CO_{2e} under Prevention of Significant Deterioration (PSD) and for HAPs.

The first step in determining major source applicability is to determine which pollutants that the project is major for, which is illustrated in the following table.

Table #2 Step One of PSD Applicability			
Pollutant	New Potential from the 2 Boilers (tpy)	Significance Threshold (tpy)	Significance Trigger (Yes/No)
PM	6.48	25	No
PM_{10}	6.48	15	No
$PM_{2.5}$ Direct	6.48	10	No
NO_x (precursor of Ozone and $PM_{2.5}$)	34.34	40	No
SO_2	0.44	40	No
CO	57.72	100	No
VOCs	3.76	40	No
CO_2 equivalent (CO_{2e})	82,447.02	75,000	Yes

This project represents a "significant emission increase" (45CSR§14-2.75) for CO_{2e}. The next step is to determine if this project results in a "net significant emission increase" pursuant to 45CSR§§14-3.4 and 2.80.c.

Basically, Boilers 13 and 14 replaced the boilers located in Power House #1. Thus, the applicant selected the calendar years of 2004 and 2005 as the baseline period to determine the past actuals (24 consecutive month period) which is in accordance with 45 CSR §14-2.8. The CO_{2e} emissions from the boilers in Power House #1 were 47,448 tons in 2004 and 35,307 tons in 2005. The baseline actual emissions of CO_{2e} rate for Power House #1 for this exercise are 41,377.8 tons (average of the emissions that occurred during the baseline period). Therefore, the net difference in CO_{2e} for this project is a net increase of 41,069 tons, which is less than the significance level and the project does not pose a net significant increase in emissions of regulated pollutant under the PSD program.

With regards to the National Ambient Air Quality Standards, Kanawha County is classified as non-attainment for $PM_{2.5.}$ The agency has formally submitted a re-designation request to classify the area (Kanawha County) in attainment for the $PM_{2.5}$ standard. However, U.S. EPA has not taken final action on this request. Regardless, the facility has the potential to emit over 100 tpy of $PM_{2.5}$ direct, which means that the Institute Site is classified as a major source of $PM_{2.5}$ direct. Thus, it must be determined if this project will result in a "significant emissions increase" and a "significant net emissions increase" in accordance with 45CSR§19-3.4.

The applicability test is for Non-Attainment Permitting (45CSR19) is nearly the same as PSD except the test is only conducted for the pollutant that the area is classified as non-attainment, which is $PM_{2.5}$ and its precursors (SO2 and NO_x for $PM_{2.5}$). This project would not represent a significant increase of $PM_{2.5}$ direct, SO_2, or NO_x emission. The significance threshold level for these pollutants under 45 CSR 19 are the same 45 CSR 14 (See Table #2). Therefore, this proposed project does not require a permit under PSD and/or Non-Attainment New Source Review.

The Boilers 13 and 14 are subject to Rules 2 & 10 (WV State Rules on PM and SO_2) and 40 CFR 60 – Subpart Dc. The requirements from these rules and regulations are very minimal for natural gas fired boilers to comply with the applicable emission standards (See Policy on Rule 13 Guidance for Natural Gas Combustion Sources).

The facility is currently classified as a major source of HAPs, which means the facility has the potential to emit 10 tons per year of a single HAP or 25 tpy of total HAPs. Within the application, Bayer has not elected to determine if this project would change the facility's major source status for HAPs. Thus, the replacement boilers are subject to 40 CFR 63, Subpart DDDDD – National Emission Standard for Hazardous Air Pollutants (NESHAP) for Major Sources: Industrial Commercial, and Institutional Boilers and Process Heaters.

This regulation establishes work practices as a means to comply with the emission standards (see Item 3 of Table 3 to Subpart DDDDD of Part 63). This annual tune-up requirement is applicable to both unit and must be conducted in accordance with 40 CFR §63.7540. These boilers were manufactured in 1979. Later, the original burners were replaced with low-NO_x burners with flue gas recirculation in May of 2010, which is prior to the new source date of June 4, 2010. Thus, Boilers 13 and 14 are classified as existing units under the Subpart DDDDD. Thus, Bayer will be required to include these affected sources when conducting the one-time energy assessment of the facility as require in Subpart DDDDD.

These units will only be capable of consuming natural gas. It is understood that sources burning this fuel are significantly below the applicable allowable limitations in Rule 2 and Rule 10, which are the State of West Virginia's rules addressing particulate matter (PM) and sulfur dioxide (SO_2) from boilers, regardless of the size of the unit. This understanding is confirmed with the provisions in Rules 2A and 10A, which exempts such sources for conducting periodic testing and monitoring for the purpose of demonstrating compliance with the limitations under these rules.

Bayer prepared and submitted a complete application, paid the filing fee, and published a Class I Legal ad in *The Charleston Gazette* on October 1, 2013. This project requires that the CO_{2e} decreases that resulted from the shut-down of Power House #1 to avoid triggering permitting requirements under Rule 14, require Notice Level C of 45CSR§13-8.5. This requires a sign be posted at the facility and a commercial display ad published in conjunction with the Secretary's "notice of intent to approve".

The units were manufactured prior to the affected source date of 40 CFR 60 Subpart Dc, which was June 9, 1989. The installation of the low-NO_x burners with flue gas recirculation did not increase emissions of pollutant regulated under Subpart Dc, Therefore, the burner replacement would not constitute a modification under 40 CFR §60.14(a) and the proposed units are not subject to the New Source Performance Standards of Subpart Dc. The facility currently holds a valid Title V Operating Permit and included Attachment S of the application for a significant modification of this operating permit.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The new replacement boilers will not emit any pollutants that aren't already being emitted by another emission source at the facility. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition of a major modification of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

Rules 2 and 10 only require recording of the amount of natural gas consumed each month for natural gas fired boilers. As noted earlier, these units are subject to the Boiler MACT which requires annual tune-ups for each boiler. The permit will require that the tune-up verify that the optimization of CO must be consistent with the manufacturer's specification and that the NO_x concentrations or setting are at or within the manufacturer's specifications.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed modification of the facility will meet all the requirements of the application rules and regulations when operated in accordance to the permit application. Therefore, this writer recommends granting Bayer CropScience a Rule 13 modification permit for their facility located in Institute, WV.

Edward S. Andrews, P.E.
Engineer

December 9, 2013
Date